

Application of conjoint analysis for consumer preference evaluation in ragi in Karnataka

Veerabhadrapa Bellundagi¹, K.B. Umesh², H.S. Roopa³, S.C. Ravi⁴

^{1,3}Senior Research Fellow, ²Professor and Head, ⁴Research Fellow, Department of Agricultural Economics, University of Agricultural Sciences, Bengaluru, Karnataka, India.

veeru.b4619@gmail.com¹, umeshuas@gmail.com², mandyarooopa@gmail.com³, ravisc3@gmail.com⁴

Abstract

Objectives: Conjoint Analysis is a statistical technique where respondents ranked preferences for different offers decomposed to determine the person's inferred utility function for each attribute and the relative importance of each attribute. The present study was attempted to evaluate the consumer preference for ragi in Karnataka, India.

Methods/Statistical analysis: The required data was collected from 120 sample respondents from Bengaluru and Vijayapura districts, respectively using structured interview schedule for the selection of attributes, later based on the consumer preferences the cards were generated in SPSS and same was used to evaluate the consumer preference for new release of ragi variety. For the Study, the conjoint analysis was employed.

Findings: The results reveal that, among all the attributes of ragi studied in Bengaluru urban, taste was found to be most important and first consideration of consumers' accounting for 39.33 per cent of relative importance with good taste having the utility of 1.21. In case of Bengaluru rural, price was found to be most important and first deliberation, accounting for 35.60 per cent of relative importance. Among all the attributes studied in ragi in Vijayapura urban, colour was found to be most significant and first consideration, accounting for 41.39 per cent. In case of Vijayapura rural also colour was found to be most significant and first consideration, accounting for 36.23 per cent.

Application: Based on the consumer preference for ragi, colour was found to be one of the most important attributes, so research has to be taken up to develop colouredragi varieties with bioavailability of nutrients.

Key words: Conjoint analysis, Consumer preference, Relative importance, Utility, Attributes

1. Introduction

Ragi in India is one of the important cereals which occupies the highest area under cultivation among the small millets. The state of Karnataka is the largest producer of ragi in India. It is gaining importance in recent years due to its medicinal and nutritive value. The value addition brings more returns to the farmers and enhances nutritional status of their family members. It is in this context, the present study has been taken up to analyze willingness to pay for the farmers as well as consumers will be estimated.

In 2012-13, India produced 19.29 lakh tonnes of ragi from 13.07 lakh hectares with an average productivity of 1641 kg per hectare. Karnataka tops the Indian ragi production with a contribution of 67 per cent followed by Tamil Nadu (11 %), Uttarakhand (9 %) and Maharashtra (7 %).

Ragi is gaining importance in the recent years due to its medicinal and nutritive value. The value addition brings more returns to the farmers and enhances nutritional status of their family members. It is in this context, the present study has been taken up to analyze the growth and instability, market competitiveness in production and value addition of Ragi. In this study willingness to accept and pay for the biotechnologically improved varieties by farmers as well as consumers will be estimated.

Conjoint analysis

Conjoint analysis is a versatile marketing research technique that can provide valuable information for new product development and forecasting, market segmentation and pricing decisions, advertising and distribution, competitive analysis and repositioning. It is a technique used in assessing consumers/farmers value judgments. Hence, in the present study, it was used to measure the consumer's preference for ragi.

The features included in a conjoint analysis experiment correspond to important consumption characteristics or characteristics hypothesized to influence purchase behavior. The levels are sample values for each of the selected features and should span the realistic range of each feature.

The conjoint experiment employs a full-profile approach, in which the level of each feature of the consumption to be rated is specified. In a full-factorial design, in which every possible combination of feature levels is rated, the number of attributes to be rated.

What attributes were important or unimportant to the consumers? What level of ragi attributes are the most or least desirable in the consumer’s mind? Answer to these questions of crucial importance in the purchase and consumption of ragi were analysed using conjoint analysis technique.

2. Methodology

Study area:

The study was conducted in Bengaluru and Vijayapura districts of Karnataka. Two districts namely ragi growing district (Bengaluru) and non ragi growing district (Vijayapura) were purposively selected

Sampling framework:

The samples were selected using Multistage Random sampling technique. Forselection of sample consumers, two regions namely ragi growing region (Bengaluru district) and non ragi growing region (Vijayapura district) were purposively selected. In each region, consumers were divided into rural consumers and urban consumers. From the ragi growing region of Bengaluru, 30 consumers were chosen randomly from urban locations while 30 from rural locations, similarly for non ragi growing region of Vijayapura, 30 urban and 30 rural consumers were chosen randomly. Thus the total sample size was 120 consumers.

The study is based on the primary data. The primary data required for the analysis was collected from the sample farmers using structured schedule through personal interview. The data was pertain to the year 2014-15.

Analytical tools used

Conjoint analysis

Conjoint analysis is a multivariate technique that is commonly used to determine the relative importance of a product’s multidimensional features, and it is particularly well suited for measuring human perceptions and preferences [1], [2]. The analysis refers to any decomposition method that estimates the structure of buyers’ preferences for a product’s features, given the buyers’ overall evaluations of a set of products described by levels of specific features[3].

Using conjoint analysis, a researcher can analyze a heterogeneous product market and obtain results that can be highly disaggregated into homogeneous groups of buyers. Alternatively, aggregating results for buyers who have similar preference or utility functions can be useful in modifying current products or services and in designing new ones for selected market segments [1].

The additive conjoint model was used in this study. The model has been formulated as:

$$Y = \sum_{i=1}^n \sum_{j=1}^m V_{ij} X_{ij}$$

Where,

Y = Consumers’ overall evaluation of the ragi.

V_{ij}=Part worth associated with ‘j’ (1,2,3,m) of attributes, ‘i’ (1,2,n) the attributes are given in Table 1 for consumers.

X_{ij}= Dummy variable representing the preference of the jth level of ith attribute.

For this study, profile describing alternatives was constructed by combining levels of four attributes. The attributes and their levels were identified through discussions with the consumers during the survey and also on consultation with marketing specialists, thus 10 cards we were generated with different combinations and same was used for the collection of consumers preferences in the study area.

Table 1. Attributes and attribute levels of ragi considered for conjoint analysis

| Sl.No. | Attributes | Attribute levels |
|--------|--------------|--|
| 1 | Taste | a. Good b. Average |
| 2 | Colour | a. Red b. White |
| 3 | Price | a. High (> Rs.25/Kg) b. Medium (Rs.20-25/Kg) c. Low (< Rs.20/Kg) |
| 4 | Cooking time | a. More b. Less |

3. Results and discussion

Pattern of attributes of ragi determining consumer preferences Consumer preference of ragi in Bengaluru urban and rural locations

The important attributes of ragi determining consumer preferences studied in Bengaluru urban and rural locations were taste, colour, price and cooking time. For each respondent, the part-worths were estimated using OLS regression analysis.

The fit of the additive model to the individual data was good. In case of urban area, Pearson’s rank correlation value with 0.701 was significant at 5 per cent level, similarly, the Kendall’s correlation value with 0.635 was also found to be significant at 5 per cent level. Similar pattern of correlations (Pearson’s and Kendall’s) were observed for Bengaluru rural locations (Table 2). This gives strong confidence in the suitability of the additive model.

Table 2. Correlations between consumer preference of ragi in Bengaluru

| Correlations | Bengaluru urban | Bengaluru rural |
|----------------------------|-----------------|-----------------|
| Pearson’s rank correlation | 0.701* | 0.729* |
| Kendall’s tau correlation | 0.635* | 0.529* |
| Constant | 0.682 | 0.724 |

Note: * Significant at 5 per cent level

The relative importance of the part worth functions was compared across different attributes within segments in order to arrive at the relative importance of each attribute. Average part-worths and the relative importance of the attributes for Bengaluru urban and rural were presented in Table 3.

Table 3. Results of conjoint analysis of ragi preference by urban and rural consumers of Bengaluru locations

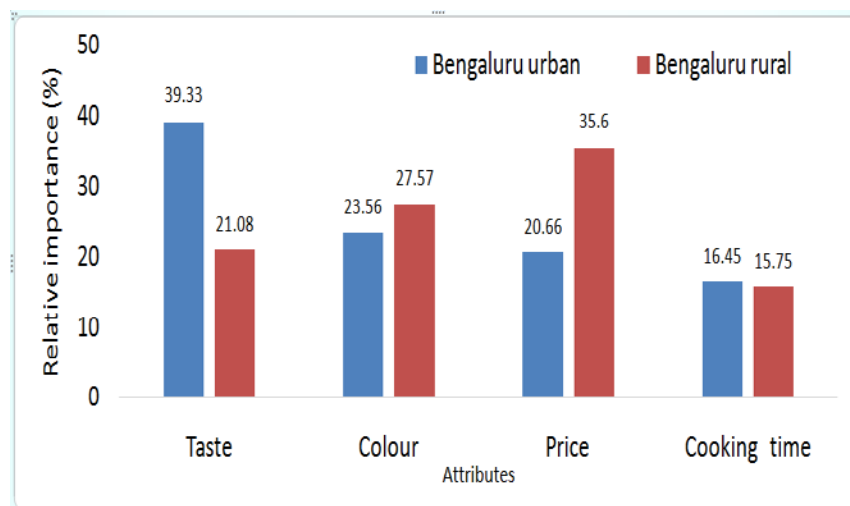
| Sl.No. | Attributes | Attribute levels | Bengaluru urban (n=30) | | Bengaluru rural (n=30) | |
|--------|--------------|----------------------|------------------------|-------------------------|------------------------|-------------------------|
| | | | Utility | Relative importance (%) | Utility | Relative importance (%) |
| 1. | Taste | Good | 1.210 | 39.33 | 0.346 | 21.08 |
| | | Average | -1.210 | | -0.346 | |
| 2. | Colour | Red | 0.320 | 23.56 | 1.274 | 27.57 |
| | | White | -0.320 | | -1.274 | |
| 3. | Price | High (> Rs.25/Kg) | -0.596 | 20.66 | -1.985 | 35.60 |
| | | Medium (Rs.20-25/Kg) | 0.267 | | 1.895 | |
| | | Low (< Rs.20/Kg) | 0.392 | | 0.121 | |
| 4. | Cooking time | More | -0.128 | 16.45 | -0.284 | 15.75 |
| | | Less | 0.128 | | 0.284 | |
| Total | | | | 100.00 | | 100.00 |

Among all the attributes of ragi studied in Bengaluru urban, taste was found to be most important and first consideration of consumers, accounting for 39.33 per cent of relative importance with good taste having the utility of 1.21. Colour had a strong influence on consumer’s preference after taste in urban area accounting for 23.56 per cent. The individual utilities were red and white coloured ragi were 0.32 and -0.32, respectively. Price formed the third most

important factor having a relative importance of 20.66 per cent. Cooking time had the least relative importance accounting 16.45 per cent, Consumers gave least importance to cooking time may be because in Bangalore urban region majority of households were using gas as cooking medium. Similarly, same pattern of preference was observed in Bengaluru rural. In general, consumption of ragi in urban areas was relatively lower, compared to rural areas may be due to substitution of other food additives. Meanwhile, as increase in income of individuals, the expenditure on necessities goes on decreasing and increasing trend on luxuries. Similar results were reported by [4].

In case of Bengaluru rural, price was found to be most important and first deliberation, accounting for 35.60 per cent of relative importance, with more, medium and less price having the utility of -1.98, 1.89 and 0.12, respectively may be because majority of consumers belonged to middle-income group in rural region. The results are in conformity with the study conducted by [5]. Colour had a more influence on consumer’s preference after price in urban area with a relative importance of 27.57 per cent. The individual utilities of brown and white coloured ragi were 1.27 and -1.27, respectively. Taste had third most important factor influence on consumer’s preference after colour, accounting for 21.08 per cent of relative importance, with good taste having the utility of 0.35. While, the cooking time was considered least important attribute with relative importance at 15.75 per cent (Figure 1).

Figure 1. Relative importance of ragi preference by urban and rural consumers of Vijayapuradistrict



Consumer preference of ragi in Vijayapura urban and rural locations

To find out the fit of the additive model, Persons rank and Kendall’s tau correlations were computed for both urban and rural locations of Vijayapura (Table 4). Pearson’s rank correlation (0.676) was found to be significant at 5 per cent level. Similarly, Kendall’s correlation value with 0.529 was also significant at 5 per cent level, indicating strong confidence in the suitability of the additive model for Vijayapura urban region. Similarly, for Vijayapura rural, the additive model was found to be fit since both Pearson’s rank correlation value (0.614) and Kendall’s correlation value (0.513) were significant at 5 per cent level.

Table 4. Correlations between consumer preferences of ragi in Vijayapura

| Correlations | Vijayapura urban | Vijayapura rural |
|----------------------------|------------------|------------------|
| Pearson’s rank correlation | 0.676* | 0.614* |
| Kendall’s tau correlation | 0.529* | 0.513* |
| Constant | 0.619 | 0.608 |

Note: * Significant at 5 per cent level

The relative importance of the part worth functions was compared across different attributes within segments in order to arrive at the relative importance of each attribute. Average part-worths and the relative importance of the attributes for Vijayapura urban and rural are presented in Table 5.

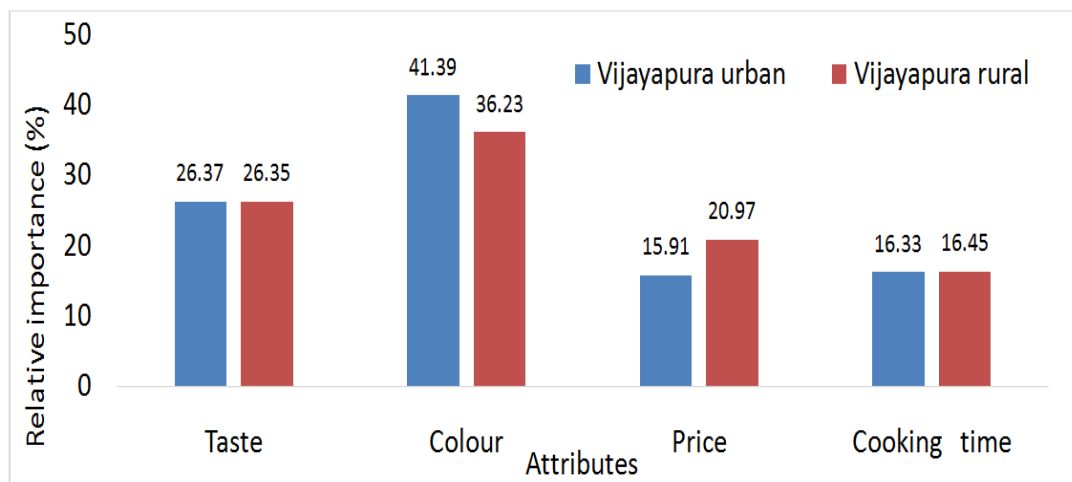
Table 5. Results of conjoint analysis of ragi preference by urban and rural consumers of Vijayapuraloations

| Sl.No. | Attributes | Attribute levels | Vijayapura urban (n=30) | | Vijayapura rural (n=30) | |
|--------|--------------|----------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | | | Utility | Relative importance (%) | Utility | Relative importance (%) |
| 1. | Taste | Good Average | 1.120 -1.120 | 26.37 | 1.080 -1.080 | 26.35 |
| 2. | Colour | Red White | 1.860 -1.860 | 41.39 | 1.550 -1.550 | 36.23 |
| 3. | Price | High (> Rs.25/Kg) | -0.570 | 15.91 | -1.750 | 20.97 |
| | | Medium (Rs.20-25/Kg) | 0.356 | | 0.310 | |
| | | Low (< Rs.20/Kg) | 0.190 | | 1.440 | |
| 4. | Cooking time | More | -0.220 | 16.33 | -0.190 | 16.47 |
| | | Less | 0.220 | | 0.190 | |
| Total | | | | 100.00 | | 100.00 |

Among all the attributes studied in ragi in Vijayapura urban, colour was found to be most significant and first consideration, accounting for 41.39 per cent. The individual utilities of red and white coloured ragi were 1.86 and -1.86, respectively, as the consumers prefer more of red color ragi due to the taste and nutritional quality. Taste had a strong influence on consumer’s preference after colour, accounting for 26.37 per cent of relative importance, with good taste ofragi having the utility of 1.12. Next to taste, cooking time had a relative importance of 16.33 per cent. While, price was least important attribute with relative importance at 15.91 per cent. The results are in line with the study conducted by [6].

In case of Vijayapura rural also colour was found to be the first contemplation and most important factor accounting for 36.23 per cent of relative importance, with red colour having the utility of 1.55. Taste was next important attribute after colour on consumer’s preference, accounting for 26.35 per cent of relative importance, with good taste having the utility of 1.08. The third most important factor influence on consumer’s preference was price accounting for 20.97 per cent of relative importance, with more, medium and less price having the utility of -1.75, 0.31 and 1.44, respectively. It may be due to majority of consumers belonged to low-income group in rural regions. Next to taste, cooking time had a relative importance of 16.47 per cent (Figure 2).

Figure 2. Relative importance of ragi preference by urban and rural consumers of Vijayapura District.



4. Conclusion

1. In ragi growing region of Bengaluru rural, the consumers considered price as most important attribute followed by colour and taste and preferring different varieties of ragi, whereas cooking time was considered least important attribute for preference of ragi.

2. In non-ragi growing region of vijayapura district, urban respondents preferred colour as most important factor whereas price and cooking time were considered least important attributes while preferring ragi. On the other, rural respondents were preferred ragi based on colour.
3. Consumption of ragi was found to be considerably higher in rural regions as compared to urban regions. Consumers are becoming more aware of the quality attributes of different commodities they are consuming, and consequently are choosing products that closely match their tastes and preferences. Demand for food products has increased among the consumers for a variety of reasons: unique quality, locality, supporting local producers.

Researchers and managers in agricultural and food industries often face problems relating to new product development, forecasting, market segmentation and pricing decisions, advertising and distribution, competitive analysis and repositioning. So a conjoint measurement study can assist them in solving these problems.

Policy implications:

1. As there is a larger scope for ragi production in Karnataka as a rainfed crop, the ragi may be distributed under public distribution system (PDS) in all parts of the Karnataka.
2. The Government should encourage the farmers to grow more of ragi with improved practices to enhance the yield of ragi.
3. Analysis of consumer preference indicated that colour was one of the most important attributes, so research has to be taken up to develop coloured ragi varieties with higher nutrient content.

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